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# DISEASES *of the* CHEST

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(A MONTHLY PUBLICATION)

*"The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind."*

Lawrason Brown, M. D.

## Editorial Comment

**The Kansas City Meeting** THE second annual meeting of the Federation of American Sanatoria, held at Kansas City at the time of the convention of the American Medical Association, has passed into history. The transactions of the meeting will be published and copies sent to all members of the Federation, but some comments on the program are in order at the present time.

In general, the business sessions were carried on in a rather informal manner, so that each physician present entered into a free discussion that was conducive to a clear understanding of the present and future plans of the organization and to a fusion of individual ideas that strengthens any group. It is certain that those in attendance were well repaid for their time and expense.

Scientific discussion was not lacking. Dr. W. W. Buckingham of Kansas City presented a very interesting group of patients in a clinical discussion of chest surgery at luncheon on the first day of the meeting. Dr. Max Rothschild of San Francisco was the chairman of this program. Seventy-five members and guests were greatly pleased with the program at the "Get-Together" luncheon on the second day. Papers were presented by Drs. J. Burns Amberson, L. J. Moorman, and Frank S. Dolley, on various phases of tuberculosis. These papers will be printed

in DISEASES OF THE CHEST so that all may have the opportunity of reading them. The tuberculosis session in the American Medical Association program on the third day, offered an excellent symposium on this disease.

The members present saw fit to reelect all of the officers of the Federation to serve for another year. Therefore, Dr. William Devitt of Allenwood, Pennsylvania, remains as president for the coming year, and the sectional Vice-Presidents, Dr. Ralph C. Matson, Portland, Oregon; Dr. George Foster Herben, Loomis, New York; Dr. Samuel H. Watson, Tucson, Arizona; Dr. Louis Mark, Columbus, Ohio, and Dr. Charles Hartwell Cocke of Asheville, North Carolina; and the Secretary-Treasurer, Dr. R. B. Homan, Jr., El Paso, Texas, remain in these positions.

Drs. Chas. M. Hendricks of El Paso, Texas; Arnold Minnig of Denver, Colorado and Champneys H. Holmes of Atlanta, Georgia will continue on the Editorial Board of Diseases of the Chest.

Dr. Devitt has announced that he will retain the same chairmen of standing committees for the ensuing year, who in turn, in collaboration with the President, will select the members of their respective committees. Many of the present committee members will serve a second term.

Dr. E. W. Hayes of Monrovia, California, was chosen President-elect of the

organization. Dr. Hayes is a nationally known authority on tuberculosis, who has served during the past year as Chairman of the Statistical Committee. The report of this committee was an exceedingly interesting and illuminating one. It will be reprinted in its entirety in the proceedings of the meeting and deserves the close study of each member of the Federation. The time and effort expended by this committee is evidenced by this report.

The officers and members of the Federation should be proud of the progress and activities of the young organization as shown by the reports of its various committees and by the enthusiastic praise which it has received from physicians in general. Judging from the progress made and from the plans drawn up at this meeting to invade fields so far untouched, the next year should bear further witness of the Federation's distinct place in the front lines of the profession's battle with tuberculosis—a battle in which each and every physician should be vitally interested.

R.B.H. JR.

**Let Us** Now, that we are safely at  
**Resolve** home, let us resolve, to rededicate ourselves to the purposes for which the Federation of American Sanatoria was formed.

Close co-operation between the physician in the general practice of medicine, the internist, and the chest specialist, to secure an early diagnosis of chest diseases is paramount. The examination of all known contacts and the isolation of the open case of tuberculosis must be carried out with precision.

Close co-operation with all existing agencies engaged in public health work, and in particular with the early diagnosis and case finding campaigns of the National Tuberculosis Association.

Through DISEASES OF THE CHEST, the official publication of the Federation of American Sanatoria, we will continue to disseminate knowledge, facts and other data on chest diseases, written in an easy, readable style for the thousands of

physicians who receive this journal each month.

To those physicians who desire a more technical journal on tuberculosis, we recommend the *American Review of Tuberculosis*, published by the National Tuberculosis Association.

And now, let us pledge ourselves, that we will each do our part to carry out the broad principles, as set forth in the program of the Federation of American Sanatoria and that when we meet next year at Atlantic City, we will again take stock of the progress made this past year and again renew those friendships which are so dear to us.

C. M. H.

**The A. M. A. THE SESSION** on tuberculosis in the Section of Miscellaneous Topics of the American Medical Association is worthy of commendation. This program was the first of its kind ever attempted at an A. M. A. meeting and its popularity was evidenced by an attendance of about three hundred physicians who sat throughout the interesting symposium.

It is not surprising that a program containing the names of James Alexander Miller, Max Pinner, J. Burns Amberson, LeRoy S. Peters and J. J. Singer should be well attended. These men are leaders in the field of tuberculosis and their efforts at this program presented in a short symposium the various phases of the tuberculosis problem as it manifests itself today. Epidemiology, resistance, pathology, case finding, and modern methods of treatment were presented in a straight-forward manner that was enjoyable to every man present. Those who found it impossible to attend are urged to read these articles in the Journal of the American Medical Association.

The need of such a program seems plainly evident to the F. A. S. and to DISEASES OF THE CHEST. Our feeling is that the leading men in the tuberculosis field are not being heard by the doctor whom the patient first consults with his disease. Certainly there are very few men other than tuberculosis specialists

who attend the N. T. A. Meeting, or the various sectional conferences on tuberculosis. At these meetings the specialists receive and discuss excellent scientific papers on tuberculosis in all of its phases, which stimulates their interest and "keeps them up" with the modern trends of tuberculosis. It seems obvious to us that a similar program should be available to the physician in general practice. The meeting of the A. M. A. is the logical place for such a session, and we believe that the interest evidenced in it this year bears out our thoughts.

In one respect the problem of tuberculosis does not differ from the problem of any other disease. We are continually adding to our store of knowledge in all fields of medicine and in all diseases, but the final page on most diseases must yet be written. Certainly this is true of tuberculosis. The doctor attempts to practice according to the modern concepts in the field of surgery, obstetrics, pediatrics, cancer, etc. He should, therefore, wish to be "up to date" in his handling of tuberculosis, a disease that has caused over 70,000 deaths in the United States in 1935.

For this reason, DISEASES OF THE CHEST strongly advocates the continuance of a symposium on tuberculosis at each A. M. A. Meeting.

Drs. James Alexander Miller, Chairman and Charles Hartwell Cocke, secretary of this session deserve mention for the arrangement of this fine program.

R. B. H. JR.

**In Appreciation To Kansas City** THE MEMBERS of the Federation of American Sanatoria desire to express their appreciation to the people of Kansas City, to the members of the Jackson County Medical Society, to the numerous committees and to the local Committee on Arrangements for the Federation of American Sanatoria Meeting for the splendid reception and the fine hospitality extended to the members of this association, during their stay at Kansas City, the week of May eleventh.

Your new Civic Auditorium deserves a

word of praise and you may well be proud of this modern edifice. Every known scientific and engineering device which goes into an auditorium has been installed for the comfort and convenience of its guests. The acoustics and arrangements are excellent and we congratulate the City of Kansas City on this fine accomplishment.

To our Committee on Arrangements, we desire to add a final word of praise for their untiring efforts in arranging for and in carrying out the many details of the program and the meeting. M.K.

**"Get-To-Gether" Luncheon Meeting** THE FIRST "Get-to-Gether" luncheon meeting of the F.A.S., held at Kansas City in conjunction with the meeting of the A.M.A., was well received by the members of the F.A.S. and their invited guests.

The program presented under the direction of Drs. LeRoy S. Peters of Albuquerque, New Mexico, chairman, and Orville E. Egbert of El Paso, Texas, secretary, was well arranged and a good deal of thought was given to the selection of the subject matter, so that a program on various phases of chest diseases could be presented within the allotted time of one hour.

The talks on Serial X-Ray Following Broncho Pneumonia by Dr. J. Burns Amberson, Jr., the Management of the First Six Months of Pulmonary Tuberculosis by Dr. L. J. Moorman and the Selection of Candidates for Thoracoplasty by Dr. Frank S. Dolley were very interesting and instructive. The conservatism sounded by each of them was very heartening. After listening to these learned gentlemen discourse on their conclusions to-date; we can truly say that sane judgement is again on the throne. These papers will appear in an early issue of DISEASES OF THE CHEST.

It is planned to make these "Get-to-Gether" luncheon meetings an annual affair and it is well for the members of the F.A.S. to arrange for their invitations early.

C. M. H.



# Pulmonary Emphysema\*

ALTHOUGH pulmonary emphysema was first described by Floyer in 1698, who called it flatulent asthma, there has been little investigative interest in this condition until the last few years. Recently, however, there has been a revival of interest. A number of contributions have appeared in the literature showing both a reawakened interest and an attempt to understand its pathological physiology; yet there is a great deal of controversy about many phases of it, particularly its etiology and effect upon the heart. All observers are agreed that pulmonary emphysema is a diseased condition in which there is dilation of the alveoli with atrophy of the alveolar walls, resulting in increased lung volume and diminished respiratory function.

## Etiology

There are so many theories as to the etiology of this condition that it is useless to discuss many of them for the majority are neither convincing nor substantiated by reliable investigative work. The most attractive theory is that small emphysema is caused by a congenital weakness of elastic tissue combined with an increased interalveolar pressure. This theory is substantiated by the fact that emphysema often occurs in comparatively young individuals who have had little or no previous evidence of asthma or bronchitis, and that it also exists in patients who have moderate bronchitis which is insufficient to produce emphysema in the average person. It is difficult to explain emphysema on any other basis. One patient may develop emphysema after a few years of moderately severe asthma or cough, while another may have no emphysema result with even more severe asthma and cough over a long period of time. There appears to be, in different individuals, a varying pulmonary resistance to increased interalveolar pressure. In some the pulmonary elasticity is lost, in others

BY  
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AND  
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it is retained under similar circumstances.

Bronchitis rather constantly accompanies emphysema but whether emphysema is present first or bronchitis is the primary condition is a debatable question, resembling that of the egg or the chicken. The sputum of emphysema is of the mucoid type, not purulent, unless it is accompanied by bronchiectasis. Certainly, many cases of primary emphysema have no history of any marked obstructive condition such as asthma or bronchitis.

## Classification

Alexander and Kountz (1) classify emphysema as obstructive and non-obstructive, the latter occurring in older patients. In the former it is secondary to obstructive conditions of the bronchial tubes as in asthma and bronchitis. In non-obstructive emphysema it is really not true emphysema at all, but a disease of the inter-vertebral disks which cause the spine to be straighter than usual, and the ribs to be more horizontal than is commonly found resulting in a barrel shaped chest. They call attention to the fact that the respiratory function is no more impaired in the non-obstructive type than it is to be expected in older individuals. This is substantiated by convincing evidence.

Osler and McCrae (2) present a workable classification of pulmonary emphysema into:

Compensatory as secondary to tuberculosis, atelectasis, fibrosis, and bronchiectasis.

Hypertrophic which is the usual primary type.

Atrophic which is a senile change in the older patients with no increase in the lung volume.

## Symptoms and Physical Signs

The most striking symptom of pulmonary emphysema is related to impaired

\*From the Tucson Clinic



respiratory function, namely dispnoea. This symptom is markedly aggravated by exertion and least conspicuous while at rest. In uncomplicated cases the patient can usually lie down prone at night and be comfortable. Moderate cough and raising of usually a mucoid type of sputum is almost constantly present. Cyanosis occurs in far advanced cases, and it is unique in emphysema that there can be marked cyanosis with comparative comfort. Exhaustion and fatigue are also prominent symptoms as one might expect with dyspnoea and poor respiratory function.

Usually the pulse is rapid and the blood pressure is lower than is to be expected in the normal person.

The physical signs most constantly present are; rounded barrel type of chest with little respiratory movement like one who is trying to breathe in full inspiration; the percussion note is unusually resonant and the bases of the lungs are rather immobile and depressed; cardiac dullness is diminished and the heart tones are faintly heard because of over-distended lung lying between the heart and the anterior chest wall; the respiratory sounds are diminished and expiration is markedly prolonged. Vital capacity readings are constantly diminished to a marked degree, usually 50% or more. Venous blood pressure readings are increased. However, these last two findings are present in other conditions, notably cardiac decompensation.

#### *X-Ray Findings*

The x-ray and fluoroscope frequently give valuable help. Often the diagnosis can be made from this examination alone. Fray (3) presented an excellent article describing these findings. Briefly these are:—

1. Low or flat diaphragmatic shadows with decreased movement.
2. Increased aeration of the lung fields and an absence of a change of radio lucency on respiration.
3. Diaphragmatic shadows, especially the left, are unusually brilliant even on

expiration due to increased residual air in the lungs.

4. Increased width of intercostal spaces and a horizontal position of ribs.

5. Bulging or flaring of ribs over lower axillary regions.

6. Emphysematous blebs or bullae.

7. Increased peribronchial markings.

However, these findings are naturally more prominent in the most aggravated cases and are not very commonly present in early or moderately advanced types. Indeed, many cases of emphysema are not recognized at all by x-ray or fluoroscopic examination although marked clinical symptoms are present. Nevertheless, the Roentgen ray is a valuable aid in diagnosis when combined with symptoms and physical signs.

The electrocardiograph offers little help. Right axis deviation is not constantly present although this is probably present more often than any abnormality.

Blood examination reveals that haemoglobin and erythrocyte readings are higher than normal, as usually occurs with cyanosis. The amount of carbon dioxide in the blood is increased while oxygen is diminished. When pulmonary emphysema is marked, the venous blood pressure is always elevated. The superficial veins are prominent and distended even though the blood pressure is lower than is normally found. At the bedside this increased venous pressure can be roughly estimated by holding the hand on a level with the right auricle and finding how high above this point it is required to raise the hand to produce collapse of the veins. Venous pressures are normally 4-6 cm. of water pressure. Normally the veins should collapse when the hand, for instance, is raised this distance above the level of the right auricle. It requires a higher level than 4-6 cm. for venous collapse in well marked pulmonary emphysema.

#### *The Heart in Emphysema*

The evidence as to whether or not the heart is involved in emphysema has been very confusing. Earlier writings on this subject mentioned obstruction of pulmo-

nary circulation due to atrophy of the alveolar walls and obliteration of the capillary bed. However, autopsy findings nearly as often revealed a small or normal sized heart with unaltered chambers as it did a hypertrophied and dilated right ventricle. Most authorities are agreed that there is diminution or obliteration of the usually negative intrapleural pressure and an increase in venous pressure which impedes the return of blood to the heart. The question arises whether the heart was normal in size or smaller due to the fact that the heart was not receiving enough blood. Indeed oedema of the extremities is a very frequent finding in emphysema, even in the absence of convincing evidence that the heart is decompensated. Landis (4) while studying capillary permeability relative to oedema found that the two conditions conducive to accumulation of fluid in the tissues were anoxaemia and increased capillary pressure, both of which are present in pulmonary emphysema to a marked degree. Kountz, Alexander, and Prinzmetal (5) presented a valuable contribution to this subject showing that in the majority of cases of pulmonary emphysema coming to autopsy, there was dilatation and hypertrophy of the right ventricle with left ventricular hypertrophy. They produced emphysema in dogs by causing atelectasis of a considerable portion of the total lung volume. Autopsies performed on these dogs revealed almost identical findings in the hearts of these animals as were found in human subjects. They suggest that the presence or absence of abnormal cardiac findings depends on the degree of emphysema. They believe that if more than 50% of the total lung tissue is destroyed there will be involvement of the heart.

#### *Emphysema in Fibroid Tuberculosis*

In pulmonary tuberculosis there is destruction of lung tissue which is replaced by fibrosis and contraction during the healing process. Naturally the area of the resulting fibrosis is smaller than the

area of the original lung. This is particularly true when cavitation has been obliterated by scar tissue contraction. As the chest cage is fairly well fixed and does not fall in readily, compensatory emphysema results. In young individuals the ribs are apt to bend inward somewhat preventing compensatory emphysema, because the chest cage is more pliable than in older individuals. When fibrosis is marked, considerable compensatory emphysema follows, often with flaring out of the ribs in the lower axillary regions and formation of emphysematous blebs. This same mechanism obtains in any other situation, causing loss of lung volume, as in bronchiectasis with atelectasis, pneumoconiosis, obstructive atelectasis and other conditions. Compensatory emphysema presents much the same symptoms as in the primary or obstructive type, but in addition it is apt to have some of the symptoms of tuberculosis. Frequently the tuberculous toxemia results in brown atrophy of the heart causing additional decrease in cardio respiratory function. When marked fibrosis is present, there must be marked compensatory emphysema unless some other mechanism relieves the situation as for instance a rise of the diaphragm or bending in of the chest wall.

#### *Differential Diagnosis*

Pulmonary emphysema is frequently associated with bronchial asthma and heart involvement and for this reason it may present unusual difficulty in diagnosis requiring prolonged observation and considerable aid from the laboratory and x-ray specialists. It is quite frequently accompanied by bronchial muscle spasm producing wheezing and prolonged expiration which can be relieved by epinephrin and ephedrine. This condition should be called pulmonary emphysema accompanied by bronchial spasm to distinguish it from bronchial asthma. Indeed, true pulmonary emphysema is caused by prolonged bronchial asthma and the differentiation may seem almost impossible. It is helpful to remember that in order to produce pulmonary

emphysema secondary to bronchial asthma, it usually requires a long period of time and seldom results in a few years. This may aid in distinguishing which disease condition was really primary.

Congenital cystic disease of the lung causes dyspnoea and similar physical findings in the lungs. Roentgenograms can usually distinguish between these conditions.

Heart disease in older individuals may give considerable difficulty because the heart is so frequently involved in far advanced emphysema. Furthermore, passive congestion of the lungs masks the typical x-ray appearance of emphysema because pulmonary oedema and engorgement of pulmonary vessels blur the peribronchial markings and lung fields. Reduced vital capacity, pulse elevation, and dependent oedema are present in both conditions. In the presence of congestive heart failure there may be noisy wheezing respiration so well described by McGinn and White (6) which simulates asthma very closely indeed. Cardiac asthma is not relieved by epinephrin while pulmonary emphysema with bronchial spasm is usually benefited. Basal lung rales, enlargement of the liver, and cardiac irregularities favour the diagnosis of heart disease while the barrel chest, the low immobile position of the diaphragm incline toward emphysema.

Fibroid tuberculosis with emphysema can usually be recognized easily by physical examination with the aid of properly exposed x-ray films if the fibrosis is marked. Both conditions may be present, however, independently.

Even in the hands of the most skilled the diagnosis of emphysema may present a most difficult problem when it is accompanied by heart failure or other pulmonary disease.

#### *Treatment*

The treatment of all types of emphysema except the non-obstructive, necessitates not only the diagnosis of the presence of emphysema but also the recognition of the degree of disability. The patient must live strictly within his

limitations and recognize the degree of his handicap for exertion beyond this point causes marked fatigue and is apt to cause a progression of his disease. Therefore, a carefully outlined regime of rest and exercise is vital to his welfare. It has been our experience that a dry, warm climate with a moderate altitude is decidedly beneficial. To our surprise, sufferers improved in spite of living in an altitude two thousand feet higher than they were accustomed to. As their bronchitis improved, their dyspnoea was also benefited. Apparently a dry, warm climate is more important than the disadvantage of a moderately higher altitude.

Every precaution should be taken against respiratory infections for they markedly increase dyspnoea and may result in a serious setback.

Years ago we found that ephedrine sulphate given several times daily benefits the majority of cases by reducing dyspnoea and cyanosis, and in a few the benefit is remarkable. Many patients say they cannot get out of bed in the morning unless they take this preparation first. Epinephrin should be used hyperdermatically if the dyspnoea is more urgent.

Oxygen therapy is very helpful in relieving dyspnoea and cyanosis. It can be used rather inexpensively by administering it for short intervals by nasal catheter or mouthpiece when the dyspnoea is most marked. The relief obtained by oxygen therapy lasts long after its administration is discontinued.

Digitalis is beneficial only when there is heart involvement with dilatation. If it is to be given, it should be administered according to the method of Eggleston (7), (8), giving approximately one grain of digitalis for every ten pounds of body weight within one or two days, and subsequently giving once daily, a maintenance dose which is about one half to two grains according to individual variations.

Recently abdominal belts have been

(Continued to page 28)



## The Limitations of Physical Signs in the Diagnosis of Pulmonary Tuberculosis\*

IT IS NOW becoming widely accepted that the presence of rales in the upper chest is the physical sign which has the greatest value in the diagnosis of pulmonary tuberculosis; it is, especially in early cases, the sign upon which real reliance can be placed.

Not only are other signs extremely variable and, in early cases, inconstant, but we all know that because the right apex is in contact with the resonating trachea, there is increased transmission of breath sounds, tactile fremitus, and vocal resonance on the right, as compared with the left. It is often difficult to say just when, as regards these signs, the normal becomes abnormal.

There is nothing difficult or mysterious, on the other hand, in obtaining rales if they are present. They are sometimes fine but usually are moderately coarse and though they may be missed during quiet breathing, can easily be heard if one listens carefully after the patient coughs at the end of expiration.

Now, how often are these rales present in tuberculosis? Heise (1) & Brown (2) of Saranac Lake found the percentages in a large series as follows:

Far Advanced—90%

Moderately advanced—75%

Minimal cases—27%

In only about one fourth of the cases at the stage at which tuberculosis should be diagnosed, could the most reliable physical sign be found.

The diagnosis of the presence of a cavity by physical signs is a very uncertain matter. Another recent study (3) shows that 50% of large, and 80% of small cavities as revealed by x-ray, will be missed by physical findings. These figures leave the examiner little reason to be proud of his skill.

What are the reasons for this sad failure?

BY  
JOHN S. PACKARD, M.D.  
Allenwood, Pa.

1st. The only cavity known in pre-x-ray days was the one found at autopsy:—a large hole surrounded by a thick fibrous wall and a zone of consolidated or fibrotic lung, and usually having a free bronchial communication; of course, it gave physical signs. Now roentgenogram distinguishes all sizes of *young elastic thin walled* cavities, which may appear suddenly and disappear, sometimes, almost as suddenly. These cavities usually give no physical signs whatsoever. In fact, for a long time tuberculosis men refused to call them cavities at all. They either said that the x-ray was wrong altogether, or that they were merely *annular shadows*!

2nd. Minimal, or as it was called "incipient" tuberculosis was conceived of as always appearing first at the apex of the lung, that is, in the relatively exposed area which extends above the clavicle, and a great many refinements in physical signs were evolved, such as cogwheel breathing, narrowing of Kronig's isthmus, and so forth, to detect early changes in this area. A recent study (4) based on 1,000 cases shows that infraclavicular involvement is more characteristic of incipency than apical, which is usually secondary; in addition the infraclavicular type is usually acute in onset and goes to cavitation well within six months, while the primary apical incipient involvement is apt to be insidious and slow in evolvment, with late cavitation. In other words, the type of early involvement which should be diagnosed as soon as possible is more often found below the clavicle where it is farther away from the stethoscope and is surrounded by a zone of normal lung which may present normal physical signs.

3rd. The x-ray can detect tuberculous lesions down to 2 millimeters in diameter. It is rather difficult to conceive of such lesions having any influence on the character of physical signs. (The Amer-

\*From a paper given at the Geisinger Memorial Hospital at Danville, Pennsylvania, October 25th, 1935.



ican Sanatorium Association's classification of tuberculosis gives "minimal tuberculosis" the generous estimate of "mottling of infiltration not larger than an area from the apex to the level of the second rib anteriorly of one lung.")

Of what value are rales in interpreting the progress of a given case, once they are elicited? Here again one may be easily deceived. While in general a decrease in number and area of rales occurs as the lesion disappears, one can place no great importance on this finding. Rales may increase or decrease while the lesion is healing, may persist after the disease is arrested, or remain unchanged when new areas of involvement are taking place. The physician must rely somewhat on symptomatic improvement and very heavily on the changes noted in serial roentgenograms taken at 2 to 4 month intervals, as well as on the presence or absence of tubercle bacilli in the sputum, and such laboratory checks as the blood sedimentation rate and interpretations of the leucocyte count.

If no great reliance is to be placed on stethoscopic findings, how is one to make an early diagnosis of pulmonary tuberculosis? Of greatest importance is the history, and in the history the following points are to be emphasized:—

1. *Fatigue.* This is the most constant early symptom and usually precedes all others. The individual complains that his fatigue has been gradually increasing, and that even after a good night's rest he is just as tired as when he went to bed.

2. *Cough.* The cough is usually slight and dry at first, and may be attributed to "cigarettes" or "chronic bronchitis." It should be a rule that any cough of more than one month's duration should be considered as of tuberculous origin until proven otherwise.

3. *Loss of weight.* Progressive weight loss when present should arouse suspicion, but frequently other symptoms will be much more significant. The fact that the patient has not lost weight should

not lull suspicion aroused by other findings.

4. *Pleurisy, with or without effusion.* Frank pleurisy should almost always be considered of tuberculous origin, unless proven otherwise. Even without this finding, however, most tuberculous individuals complain of shifting chest soreness or heaviness, and this may be a valuable clue.

5. *Hemoptysis.* Frank hemoptysis is an indication of the presence of tuberculosis in so high a proportion of cases that this finding should never be dismissed until an accurate diagnosis is made.

6. *Tubercle Bacilli in the sputum.* Early tuberculosis can and should be diagnosed before tubercle bacilli can be demonstrated in the sputum, for this finding is usually preceded for a variable period by one or more of the above symptoms, and repeated negative sputum examinations should not lead one to dismiss the diagnosis of tuberculosis when suspicious symptoms are present.

#### Conclusions

When suspicion is aroused by any of the above findings, good stereoscopic roentgenograms are always indicated regardless of negative physical findings or appearance of the patient. We must get away from the idea that the tuberculous patient must resemble the textbook pictures of the cadaverous "consumptive" we know so well.

Whenever one case is diagnosed, others may often be discovered by:

(a) Tuberculin testing all children in the patient's family and having x-rays of positive reactors.

(b) X-rays of every adult in the family may reveal the source of infection in the patient you have already diagnosed.

Tuberculosis is, first of all, a household disease, and by investigating the patient's relatives, one may discover cases of tuberculosis before symptoms and physical signs have appeared—that is a real achievement in diagnosis and

(Continued To page 28)

# Bronchiectasis

BRONCHIECTASIS is a chronic infection of the bronchi which gradually weakens the bronchial wall

in such a manner as to ultimately result in either a cylindrical or saccular dilatation of the affected bronchus, and next to pulmonary tuberculosis is probably the most frequently encountered chronic pulmonary affection known. While it may originate as a unilateral condition, it practically always becomes bilateral as the disease progresses. It occurs more frequently in males than females, and while it may occur at any age period, it is most commonly found between the ages of twenty and forty, although it may brew unrecognized for many years.

The causes of bronchiectasis are numerous and varied, and many conditions have been blamed for the changes occurring in the bronchi. It is known to be congenital in many individuals and frequently occurs in several members of the same family, while in other patients an alternation in the bronchial secretions is supposed to favor invasion by noxious bacteria which finally leads to a weakening of the bronchial wall and allows dilatation to occur.

Some observers believe the condition is due to a loss of nerve control of the bronchus. Acute infectious diseases are known to cause bronchiectasis, and following the influenza pandemic of—1918-1919—there was a tremendous increase in the incidence of this condition. More recently it has been observed that chronic sinus infection is generally associated with this disease and must therefore be a causative factor in its production. Any condition that produces an obstruction to the free outflow of air for a long period of time will eventually cause bronchiectasis. The commonest cause is probably any chronic pulmonary disease such as chronic bronchitis, asthma, or chronic pulmonary tuberculosis, which is characterized by long continued cough or ex-

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piratory effort. When the patient becomes annoyed by the symptoms produced by this condition,

the disease is already in the advanced stage. The predominant symptoms are cough and expectoration, and the character of these symptoms is distinctive. The patient may pass a great part of the day or night without any difficulty and then in a severe paroxysm will bring up copious quantities of purulent foul-smelling sputum. This can be readily understood when it is considered that the dilated bronchus acts as a reservoir in which secretions stagnate and decompose until discharged. Sometimes change of position will bring about a violent attack of coughing, probably due to the fact that some of the secretion flows from the dilated bronchus to a normal tube. The severest paroxysm generally occurs in the morning upon arising, and the patient may bring up most of his sputum at that time. The amount of sputum expectorated in twenty four hours generally is very large, varying from 200 to 1,000 C.C. Hemoptysis is also a common symptom, and even large hemorrhages are not a rare occurrence, and this has led many patients to be diagnosed as suffering from pulmonary tuberculosis instead of bronchiectasis, although it is not at all uncommon for both diseases to exist in the same individual. Clubbing of the fingers is probably more pronounced in bronchiectasis than in any other chronic pulmonary disease.

As a general rule the bronchiectatic patient is well nourished and capable of doing full time work for many years, until the paroxysmal cough and foul sputum make it embarrassing for the sufferer to mingle with his fellow workers. Occasionally dermatitis occurs with the reservoirs of purulent secretion acting as a focus. Colitis may occur in those patients who are careless enough to swallow their sputum over long periods of time. High fever,

weakness, progressive loss of weight and inability to work appear late in the disease and generally lead to a fatal termination. In some mild forms of bronchiectasis, the symptoms are very benign and the patient suffers very little inconvenience from his disease, but these are generally unrecognized and consider themselves suffering from chronic bronchitis.

Our greatest advance in making an early diagnosis of this condition has been made rather recently, and consists of an iodized oil injection into the bronchial tree through various means. The oil in the bronchi casts a dense shadow on a roentgen film, and the dilations can readily be recognized by comparing them with the normal bronchi shown on the plate.

The treatment of bronchiectasis in the past has been chiefly medical, but as the results were more or less unsatisfactory and yielded relatively few cures, surgery has been much more frequently employed during more recent times. In those cases in which surgery is precluded due to the advanced stage of the disease in both lungs, medical treatment has to be depended upon, and consists of the patient devoting his life to taking care of his health.

The patient gets along more satisfactorily in a dry warm climate in the winter time. Postural drainage is very important and the most favorable position should be studied for each patient. Generally this consists of sleeping with the head lower than the feet. Attention should of course be directed towards the sinuses and these should be treated if infected. Intra-tracheal injections of various deodorizing and antiseptic solutions have been used with considerable benefit. Among these solutions, it was accidentally discovered that the iodized oil used in making the diagnosis is of greatest worth. Various inhalations or vapor baths are recommended, and limiting the fluid intake to a minimum has a tendency towards reducing the amount of sputum expectorated. Vaccines prepared from the organisms found in the bronchial dilatations have proved rather disappointing, so that while medical treatment may be of help as a palliative measure, it

can be dismissed as a curative agent.

While there are certain dangers to be encountered in the surgical treatment of bronchiectasis, in the properly selected cases, it holds forth greater promise for cure. At the present time the most widely practiced surgical procedure is some form of collapse treatment, and the simplest of these is the induction of pneumothorax where a space can be obtained. In the ideally selected case this treatment has been productive of brilliant results. In other patients in whom pneumothorax cannot be administered, phrenic neurectomy has brought about very striking results. A word of caution might be in order at this point; namely, that this procedure should not be performed in the old uncollapsible bronchiectatic lesions, as the abolition of the pumping action of the diaphragm might promote stagnation of secretion. In certain selected cases in which neither of the above measures are practical or successful, thoracoplasty is often a procedure that brings about a cure. Other surgical measures, such as draining the bronchial dilatation externally through the chest wall, or removing an entire lobe of the affected lung, have been resorted to, but the mortality is very high and the operation is not commonly performed.

Untreated or neglected cases can carry on for many years progressing downwards slowly until secondary degenerative changes occur in other vital organs of the body and lead towards a hopelessly incurable condition with a fatal prognosis.

### *Pneumothorax Directory*

The Pneumothorax Directory listing the members of the Federation of American Sanatoria who are qualified and equipped to give pneumothorax is now being prepared for the press.

If you are eligible for membership in the F. A. S. and are equipped to administer pneumothorax; and have not as yet applied for a listing in the directory, you are advised to make application at once.

No further applications will be accepted after June 20th, 1936, for a listing in this year's directory.



# Childhood Type Tuberculosis

SO MUCH has been said and written about childhood tuberculosis, that it is not without a certain amount of diffidence this paper is written. It is not with the thought of offering any new or original data, but rather in the hope that it may prove of interest to present the picture as it has taken form in the course of sixteen years' observation of many thousands of children who have passed through the Municipal Tuberculosis Clinics of Baltimore.

The material has been garnered in the routine examination of open air class pupils, candidates for preventorium care, the examination of child contacts, and the usual "run-of-the-mine" children that are brought to the clinics for malnutrition, persistent cough or similar symptoms.

It should be mentioned that the childhood type of the disease is not necessarily confined to children any more than the adult type is confined to adults, but has received its appellation through its more common occurrence as a clinical entity in children, just as the more classical signs of tuberculosis are usually encountered in adults.

It was not until the work of Landouzy (1) (1885-91) and of Ghon (2), Pirquet and Naegeli in the early part of the present century that tuberculosis was recognized as an infection frequent in childhood. Prior to this, and due largely to our lack of knowledge of the tuberculin test and the infancy of the roentgen ray, tuberculosis was considered a disease chiefly affecting young adults and recognized in the pulmonary or adult form by the usual signs and symptoms, including the discovery of tubercle bacilli in the sputum. There is little doubt that most of these young adults who developed the disease in the nineteenth century, were then, as now, the victims of an infection that had been latent and unrecognized

from early childhood.

Young people who have been harboring tuberculosis for years, finally break

down when they assume the burdens of work and the heightened responsibilities common to late adolescence. The child may overcome many physical handicaps. If he tires at play, he can stop, and his days are spent largely out of doors. Once school days are ended, the average boy and girl goes to work; they are soon married and the young husband must work hard at his job to support his home, while the young wife assumes the tasks of a household and in addition to these must usually bear children. A latent tuberculous focus soon becomes manifest and the pulmonary type or adult form is apt to develop.

*Modes of infection:* This occurs usually through direct contact between the child and an open case of tuberculosis. The infant nursed in the arms of a tuberculous mother, the young child crawling about the floors of rooms occupied by tuberculous patients, or fondled and caressed by the sputum positive case, soon becomes infected with the disease.

*Pathology:* Tubercle bacilli may gain entry through direct inhalation of dry bacteria or by ingestion. Less commonly, infection may occur through the eyes or nose, as when, for example, the sputum soiled handkerchief of a patient is used to wipe the eyes or nose of a child. Having entered the child's system, the bacillus does not necessarily set up tubercle formation. Not infrequently, it simulates typhoid fever, or, in less severe cases, may be mistaken for grippe or a protracted febrile gastro-intestinal disturbance. This appears to be the initial onset of the primary infection. In most instances, however, tubercle formation does occur after a varying length of time in one or more of the lymph nodes that may or may not be near the site of infection. Such infection may be very in-

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sidious and give rise to no recognizable clinical symptoms other than a *tuberculin sensitization conferred upon the infected individual*. In such cases, the tuberculin test is the only means of ascertaining the presence of the infection.

The lymph nodes commonly affected are those clustered about the trachea and large bronchi at the roots of the lungs, the mesenteric glands, and the peri-bronchial group which are very small and numerous and found along the course of the bronchial tree throughout the lungs. All of these nodes are connected by a network of lymphatic channels that renders communication from one to another very free. They are in turn connected with the lymphatic system of the lungs and pleurae, the cervical chains above and the diaphragmatic groups below.

Prior to the age of three years, there is great danger of these glands caseating, breaking down and disseminating into a generalized miliary tuberculosis, usually fatal. After three years, however, the child appears to possess a better defense mechanism which promotes fibrous tissue and calcification and so inhibits the spread of tubercles.

*Signs and Symptoms:* After the initial infection has run a course of several weeks, if miliary or pneumonic forms do not develop, the child apparently recovers, plays about again as usual and may seem quite well. Careful scrutiny will usually reveal that all is not right. There is an intangible change in the child. He may be listless at times, the appetite is not quite so good, the cheeks are a little pallid or even have a wax-like appearance. There is often a persistent rise of temperature daily to 99 or 100 degrees, and frequently the child fails to gain weight normally. A child that does not gain normally is really losing weight. If he should normally gain ten pounds in a year and gains but five, he has really lost five pounds. This is a point frequently overlooked, although weight discrepancies should not be the accepted hall-mark of tuberculosis since many tuberculous children are normal or even overweight. It has been our

experience that the majority of tuberculous children are definitely below the usual weight standards. Moreover, we have found the normal or overweight tuberculous children much less a problem than those whose infection is complicated with malnutrition. This extra weight, if present, provides reserve strength to oppose the invader.

Another manifestation of latent tuberculosis in children is the apparent lack of resistance displayed to other infections. Not uncommonly a mother will inform us that her child has had every juvenile disease on the calendar, or that common colds are frequent. These cases remind one of a nation at war with a major power, successfully holding its own against the principal enemy, while lacking the reserve forces to combat numerous raids of minor marauders across unguarded frontiers. Children who fall sick frequently with all sorts of childhood disease should be studied with tuberculosis in mind.

Hoarseness, continuous or intermittent, may be present and is due, either to reflex nervous stimuli, or, more commonly, to pressure upon the recurrent laryngeal nerve by enlarged lymph nodes. It is practically never due to tuberculous laryngitis, which is very rare in children. Laryngitis, if present, is due to some associated benign infection.

Cough may not be present at all, but many of these children do present this symptom, not because of the tuberculous infection itself, but more often because of a concurrent bronchitis brought about by frequent non-tuberculous respiratory infections, post-nasal drainage and similar catarrhal disturbances reflecting the lowered resistance present.

Sputum, when present, is like cough, usually due to associated bronchitis or other respiratory infections rather than to tuberculosis. Occasionally tubercle bacilli are found in the sputum of children or on swabs from the pharynx, but so rarely does this occur that it is a negligible consideration. It is only when a child has developed the adult type that the sputum

becomes positive. These children are generally quite ill and usually die.

Enlarged glands in the neck are due to a variety of causes, chief of which is tonsillitis. If the cervical groups are enlarged, tuberculosis should be kept in mind as a possible cause. This group is more apt to be the site of an extension of the lymphatic focus lower down.

Fatigue out of all proportion to the energy expended is one of the most common symptoms of childhood tuberculosis. They tire easily and are frequently accused of laziness by teachers and parents.

Pleurisy with effusion is often present, and if not accompanied by pneumonia, should be considered tuberculous. It has been our experience that such pleural effusions may exist without their presence being suspected. Really amazing quantities of fluid may be discovered in the pleura on physical or x-ray examination with relatively little disturbance in the child's ability to play about.

Most physical signs are conspicuous by their absence. The pleural effusions are, of course, as conspicuous on physical examination as in older subjects. Parenchymal lesions, which are nearly always of insignificant size, and slight or moderately enlarged mediastinal glands, can rarely be demonstrated by physical examination. D'Espine (3), devised the sign which bears his name. It is the accentuation of whispered voice sounds to the fourth or fifth dorsal vertebra. The stethoscope is placed over the eighth cervical vertebra, and with the child's head bent forward, he is told to whisper "one, two, three" to get the normal intensity. The process is repeated over each vertebra below until the whisper suddenly fades. Normally, this occurs at the first or second dorsal, but if there are enlarged tracheo-bronchial glands present, the whisper retains its sharp, sibilant quality to the fourth or fifth dorsal. The sign, while not always present, is fairly dependable.

Ziskin (4), of Lymanhurst, reported a sign frequently present in mediastinal glandular enlargement. This is a systolic heart murmur, heard at the cardiac apex

or the left margin of the heart, and due to enlarged nodes pressing upon the pulmonary artery. The sign, while not constant, occurs with some degree of frequency. If present, it should be noted as an additional clue to underlying pathology.

The tuberculin test affords us our greatest single measure for separating the suspicious from the negative. It is the starting point for all our investigation into the possible presence of tuberculosis in children. The Mantoux or intradermal test is the more reliable method, the first dose being 1/100 milligram if the stock tuberculin used is known to have a high potency, that is, if the reactions found to develop with 1/10 milligram are repeatedly very marked. Many of the commercial brands of tuberculin permit of starting with the dosage of 1/10 milligram. In either case, if the first test is negative, a second dose of 1.0 milligram is injected intradermally after forty-eight hours, and if this is also negative, the child may be considered non-tuberculous ordinarily. The older method of Pirquet of scarifying the epidermis through a drop of tuberculin is not as dependable as the intradermal test, but is useful if the examiner does not have ready access to the freshly prepared dilutions needed for the latter test, which must be renewed weekly, kept cool, and require preparations under careful laboratory technique. The Pirquet method is also of value when parents object to "needles." Recently, more conveniently prepared modifications of tuberculin dilutions have been placed on the market in the form of tuberculous protein extracts. These are put up in packets containing six to twelve tests, keep fairly well and may be prepared in a few minutes when needed. The preparation is not quite as strong as a good grade of tuberculin, properly diluted, but for all ordinary purposes, it may be used with confidence.

A positive tuberculin test does not necessarily mean active or even latent tuberculosis, but merely reveals the fact that the child has been infected at some time. About twenty-five per cent of all school

children for example, are positive reactors and the test eliminates seventy-five per cent of any given group of such children by a simple and inexpensive process. In the case of the individual child, it tells us whether or not the child has been exposed and infected some time in the past. The younger the child with a positive reaction the more likelihood of his having an unhealed focus of tuberculosis.

Over fourteen years of age, there is little value in the positive test, but a negative test informs us we are not apt to be dealing with the disease. Occasionally, children who have recently had acute infectious diseases, particularly measles, may react negatively even when tuberculous infection has taken place. The test is frequently negative in the terminal stages of tuberculosis. For all ordinary purposes, these exceptions may be disregarded.

The x-ray examination of all positive reactors is the next step in diagnosis and is the only certain means by which one can determine the presence of either mediastinal glandular disease or the very small parenchymal lesions so often present. Frequently the glandular shadows are quite distinct with the aid of a good fluoroscope, but if not, the film should be used, as small glands and the tubercles of Ghon are rarely found by any other means.

### *Treatment*

Primarily this must include the four cardinal principles laid down by the National Tuberculosis Association:

- (1) Termination of contact with the source of infection, either by strict isolation of the infective case, or preferably by separation of the two, by removal of one or the other from the household.

- (2) Rest through the avoidance of excessive physical exercise and the mental strain of ambitious school curriculums.

- (3) Tonic measures for improving the general health of the child and the correction of defects.

- (4) Care in maintaining the psychological balance of the child that will prevent

his developing inferiority complexes on the one hand or over-indulgence in active pursuits on the other.

It is not always an easy matter to carry out this program. The inadequate laws on our statute books to enforce the separation of an open case from those around him, the difficulties often encountered of getting the open case away to a sanatorium, and of keeping him there when he is away, the crowded condition of many homes, and the economic status of the family are all factors that defeat the first of these principles. The length of time the child must be kept under observation, the natural propensity of children to indulge in excessive exercise, the difficulty of obtaining adequate medical care, the effect of age, race, environment and resistance are adverse factors in carrying out the second and third principles. The fourth, which has to do with the psychological adjustment of the child, is easily demoralized by ignorant neglect on one hand and over-solicitous pampering on the other.

We must not lose our sense of proportion in the approach to this problem. The great difficulty in determining where infection leaves off and disease begins, and the mass of confusing opinions relating to this transition render it an extremely perplexing question.

Although approximately twenty-five per cent of all school children are positive reactors, but four per cent will reveal sufficient evidence of childhood type tuberculosis to require their being kept under observation, and less than half of these will need actual treatment. These figures are derived from the studies and conclusions reached by the Massachusetts Department of Public Health after the examination of several hundred thousand school children. We must be guided by a number of factors and again, age, race, environment and apparent resistance will play an important role, together with the presence or absence of symptoms and physical findings.

*Age:* Children under five years old must be watched very closely, as most of the deaths from tuberculous pneumonia



and miliary disease occur in this group. Infants are prone to develop meningeal tuberculosis. The x-ray must be freely used in infancy, as many massive pulmonary changes may be present with few or no physical signs. Grade school children, as a whole do well; even in the presence of active disease, fatalities are exceptional. Over fourteen years of age, there appears a tendency to develop the adult type of tuberculosis. This is unfortunate as it is at this age that we are apt to lose track of these children. In their teens, boys are neglectful of health examinations while prone to indulge in violent exercise such as foot-ball, basket-ball and track running. Girls at this age are shy and object to physical examinations just as the menstrual cycle is established with its added physical and nervous instability.

*Race:* Negro children are prone to develop the more serious adult and pneumonic types of tuberculosis at all ages. In addition, their environment is usually unfavorable. How much the latter is responsible and how much is due to an inherent racial lack of resistance is a moot question. Probably both are factors.

*Environment:* Children living in crowded homes, in poor hygienic surroundings, attended by ignorance, indifference and neglect, and denied the benefits of fresh air, sunlight and adequate food are obviously in greater danger than those more favorably situated. Tuberculosis death rates in both adults and children rise in direct proportion to the congestion of population in any given district.

*Apparent Resistance:* Normal or overweight children appear to resist tuberculosis much better than the malnourished anaemic types. An apparently healthy child, who plays normally, is abreast of his schoolmates in class-room work and whose appetite is normal presents a much more favorable prognosis than the pale, malnourished child, retarded in his school curriculum and of a finicky appetite.

*Physical Findings:* Children with tuberculous infection may be divided into five groups:

(1) Positive tuberculin reactors, who show no evidence of the disease on x-ray examination or else only a slight root infiltration and appear to be in normal health. These make up the great majority of cases.

(2) Positive reactors who show no evidence of the disease on x-ray examination, but are obviously in poor health, undernourished and anaemic.

(3) Positive reactors who reveal small calcified nodes in the root or parenchyma of the lung.

These three groups should be examined periodically, every two to six months according to the gravity of the clinical picture or the seriousness and frequency of exposure. These examinations should be continued until the child is of age or until his health has improved beyond any likelihood of his developing the disease. All contact with any known source of infection should be terminated as promptly as possible.

(4) Cases with definite pulmonary changes.

(5) Cases with large root nodes that have not undergone calcification.

These two groups should receive intensive treatment, generally bed rest at the outset, and preferably in a sanatorium.

#### *Open air school rooms*

It is very doubtful if open air, per se, plays any part in the treatment of tuberculous children. The regimen of additional food, graded exercises according to the indications of the individual case, and possibly the relaxation of the rest period when the child is made to lie down for an hour each afternoon may be of value. Under no circumstances, should a child considered actively tuberculous be placed in an open air class. It is the first three groups and the ex-sanatorium (cured) cases that may be referred to these classes. Most of the measures carried out in these classes are applicable in any modern, well-ventilated school-room without constructing special and expensive additions. Every effort should be made to prevent unfavor-



able psychological factors developing in the child's mind while attending such classes, and the treatment should be carried out only if accompanied by a well planned regimen in the child's home. This coordination between the home management of the case and the school-room program requires the fullest co-operation by the parents of these children. All too often, parents feel that the mere attendance in a special class of this type constitutes all that is necessary in the treatment of the child's condition.

### *Preventoria*

There seems little doubt that a well managed preventorium is a useful adjunct in the treatment of children infected with tuberculosis. It serves a valuable purpose both in preventing development of the disease, separating the child from known sources of infection until the open case is disposed of, and lastly, the post-sanatorium cases may be transferred from the sanatorium to the preventorium in order to grade the child from the relatively limited activities permitted during sanatorium care to those that may be expected when he returns to normal home and school life. The time factor is most important in preventorium treatment. The child must remain there as long as his condition requires such a regimen. Here again, the home management must be coordinated with the treatment received. Discharging children from the well-ordered environment of a preventorium into bad home surroundings will not only undo all the good accomplished in the former, but may prove actually harmful by a sudden reversal of an environment to which the child has become accustomed.

### *Case Finding by Means of Children*

The discovery of these cases, even those who are merely positive reactors, is one of the most valuable aids we have for revealing adult cases in the home. The positive reaction on the child's arm is a striking reminder that somewhere in his

environment he has been in contact with an open case. It is the opening wedge for direct inquiry into the health of the family and is a valuable "talking-point" in impressing upon the discovered open case the danger he may be to those about him.

### *Conclusions*

Any program for the prevention and treatment of tuberculosis in children should include:

(1) Means for the discovery and supervision of all open cases, with particular emphasis on the isolation of the advanced case.

(2) The local health officer should be empowered to commit the recalcitrant and deliberately careless open case to an institution where he will not endanger those about him.

(3) Contacts should be examined and re-examined periodically.

(4) School children should be examined yearly if possible and the highest attainable level of children health should be maintained by correcting all physical defects. Special emphasis should be laid upon the examination of high school students.

(5) Active cases should receive adequate treatment, preferably in a sanatorium.

(6) In order to prevent infection of children with the bovine form of the disease, the milk supply of the community should be pasteurized.

(7) The discovery of new cases is best accomplished by means of the tuberculin test and the x-ray examination of all positive reactors. If this is done, it is even possible to eliminate the usual physical examination when time is a factor. All child contacts of known sources of infection should be examined repeatedly.

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# Collapse Therapy of the Lungs

IN PRESENTING this paper on the indications for surgical collapse of the lung, only the most important indications and contra-indications for these procedures will be mentioned, that is, the clear-cut indications and contra-indications.

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## *Indications for Pneumothorax*

1. Minimal lesions which show signs of progression. It is in this type of case that there is much discussion but we believe that the general trend is to use pneumothorax much earlier than a few years ago.

2. Hemorrhage which can not be controlled by other means, even though the case is bilateral.

3. Unilateral tuberculous pneumonia, within a few days after onset often prevents adhesions and cavity formation.

4. Tuberculous pleural effusion. In this type of case approximately 50% of the fluid should be withdrawn and replaced by air, followed by refills as necessary until the pneumonic process has cleared up.

5. Spontaneous pneumothorax may require pneumothorax to maintain a collapse and combat empyema. This is especially so in those cases which have only unilateral involvement.

6. Chronic unilateral tuberculosis with cavitation. Pneumothorax is indicated in this case if they show no signs of improvement after a period of bed rest.

7. Bilateral disease with unilateral soft walled cavities. If after a period of compression the opposite side shows increased activity a partial reexpansion should be allowed to occur and pressure attempted on the contra-lateral lung.

8. Bilateral cases which remain stationary. It is in this type of case that the best results from bilateral compression are obtained.

9. Preparatory pneumothorax on contra-lateral better lung to improve indications for thoracoplasty.

This is used as a test measure to thoracoplasty to determine the effect on the contra-lateral lung.

10. There are several non-tubercular conditions which will briefly be mentioned. 1. Diagnostic tuberculosis as in the case of tumor or abscess of lung. 2. Bronchiectasis, especially if the process is unilateral. The results are variable, some reporting a high percentage of cure and others recommend other surgical procedures. 3. Abscess. Good results are obtained if compression is started early before the cavity has become too thick walled. 4. Pneumonia, this being a new indication and the number of cases being so few that conclusions should be withheld as to its routine use. 5. Acute hemothorax. 6. As a preliminary to further surgical procedures.

## *Contra-Indications for Pneumothorax*

1. Presence of adhesions or thickened pleura.

2. Serious tuberculous complications, such as laryngitis and advanced intestinal lesions. These, according to some authors, are not contra-indications but usually the advanced intestinal lesion being a definite contra-indication although occasionally a laryngitis will clear up.

3. Active process on good side.

4. Age. From the age of 18 to 35 is the most favorable time for pneumothorax. In patients over 45 pneumothorax is definitely contra-indicated except in emergencies such as hemorrhage.

5. Organic heart disease except in emergency such as hemorrhage.

6. Asthma, Emphysema and Silicosis.

7. Extreme emaciation.

## *Indications for Phrenicexeresis*

1. Positive sputum which can not be controlled by pressure alone.

2. Basal lesion. This type of lesion is

\*Read before the Annual Meeting of the Eighth District Medical Society, Ohio, June 20, 1935.



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most amenable to phrenicexeresis if pressure is impossible because of adhesions or thickened pleura.

3. An alternative for pneumothorax impossible in view of pleural synthesis.

4. Accessory to pneumothorax when cavities are held open by adhesions. Even a slight rise in the diaphragm may cause enough relaxation that by continued pneumothorax a complete closure of the cavity may result.

5. Hemorrhage.

6. As an economic or compromise measure. In this type of case that can not be hospitalized and can not return at frequent intervals for refills.

7. To lengthen intervals between refills.

8. As an alternative measure when pneumothorax is refused.

9. As a preliminary measure to reexpansion.

10. Palliative in cases to relieve cough in far advanced conditions.

11. As a preliminary to thoracoplasty.

12. Non-tuberculous indications such as bronchiectasis and abscess.

#### *Contra-Indications for Phrenicexeresis*

1. Rigid walled cavities.
2. Acute progression of disease.
3. Emphysema.
4. Undrained empyema.
5. Complicating intestinal tuberculosis and possible laryngeal.

#### *Intrapleural Pneumolysis*

This being a secondary operation following attempts at pneumothorax, it is

used to sever adhesions and allow the lung to collapse, the only definite contra-indication being that the large adhesion contains lung tissue or large blood vessels or is close to a lateral cavity.

#### *Indications for Thoracoplasty*

1. Sauerbruch ideal indication is unilateral fibrosing tuberculosis with rigid mediastinum, capable heart, youth and good resistance.

2. Positive sputum that can not be cleared up with other measures.

3. Severe recurrent hemorrhage, uncontrollable by other means, when the source of bleeding is definitely ascertained and the contra-lateral lung does not prohibit.

4. Severe unilateral bronchiectasis after failure of other means.

5. Selected bilateral cases with retrogressive changes in better lung.

6. Unilateral cavitation where pneumothorax or other surgical means have failed or are inapplicable.

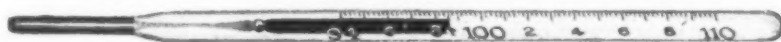
7. Tuberculous empyema with failure of reexpansion.

8. Bronchial fistula.

#### *Contra-Indications for Thoracoplasty*

1. Heart and kidney complications.
2. Amyloidosis except in mild degree.
3. Bronchial asthma.
4. Advancing bilateral types.
5. Diabetes of severe types.
6. Neuropsychiatric individuals.

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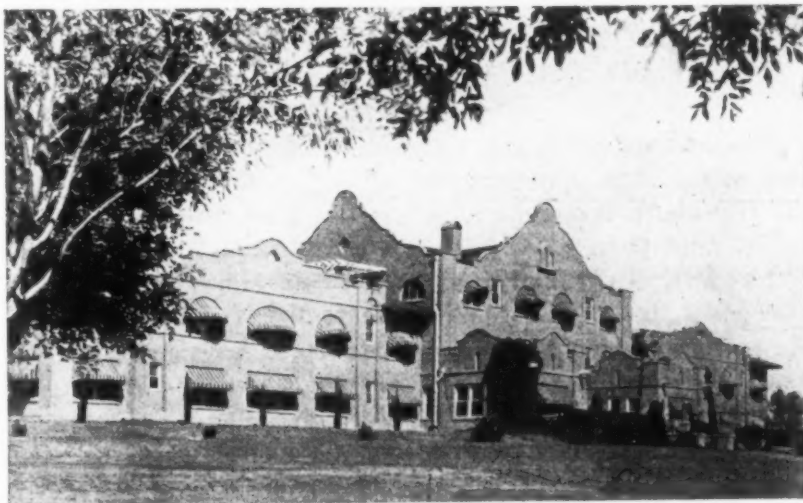
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## CASE REPORTS



### *A Clinical Arrest of Unusual Interest*

L. B. Male, Age 32, Cattleman. History of repeated colds for several years, but general health very good. In 1927 he suffered an attack of acute respiratory trouble which was diagnosed as influenza. He continued to cough following this attack, lost some weight, and did not feel well, but did not consult his physician. At times he thought he had some fever, and continued to expectorate a moderate amount of rather thick muco-purulent secretion. His own diagnosis was that he had "catarrh".

In June 1928 he was induced to consult his physician who found positive sputum and referred him to us. Chest examination revealed extensive active tuberculosis throughout the entire left lung, with one cavity about an inch and a half in diameter, just below the clavicle and another near the base, somewhat larger and apparently situated more to the back of the lung. There was some active trouble at the right apex, but no cavitation. Stereo X-ray films verified these findings.

This patient was advised to carry out a complete bed rest with sanatorium routine until the trouble in the right lung could be controlled, and then have pneumothorax on the left. In about four months there seemed to be sufficient improvement on the right side to justify pneumothorax on the left, but the adhesions were so extensive that a monometric reading could not be obtained so pneumothorax was impossible.

Since there had been very satisfactory improvement in both lungs up to that time, patient was advised to continue

bed rest treatment in the sanatorium for an indefinite time. Such treatment was continued for three years. Stereo X-ray films were made at infrequent intervals, each set showing continued satisfactory changes. At the end of three years a modified bed rest treatment was continued at home with a gradual increase in up time until in December 1935 when physical signs and X-ray films showed that all evidence of active tuberculosis had disappeared.

The patient had been symptom free for several months.

In addition to usual sanatorium routine, calcium was administered intravenously throughout the seven years—with occasional periods of rest. A preparation of iron was administered intravenously during the first two or three months to correct a secondary anemia.

I have reported this case for the purpose of recalling the fact that many patients will eventually secure an arrestment of even far advanced tuberculosis if they continue to carry out the proper regime for a sufficient length of time. Neither the physician nor the patient should become discouraged when it is found that pneumothorax is out of the question and the patient is not in proper condition for more extensive chest surgery, or if he objects to that line of treatment.

Many patients have a greater resistance to tuberculosis than we realize and should usually first be given a chance to carry out a routine rest treatment unless there are some conditions in that particular case which make it inadvisable to do so.

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When writing please mention DISEASES OF THE CHEST

# THE LIMITATIONS OF PHYSICAL SIGNS IN THE DIAGNOSIS OF PULMONARY TUBERCULOSIS

(Continued from page 13)

preventive medicine! I might quote in closing the dictum of Dr. James Alexander Miller: "Early tuberculosis must be seen and not heard!"

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## PULMONARY EMPHYSEMA

(Continued from page 11)

advocated by Alexander and Kountz (9), also by Meakins and Christie (10) in order to elevate and convert a flattened, immobile diaphragm into a rounded and functioning one, increasing vital capacity and relieving dyspnoea. To accomplish this the belt must be so arranged that it produces an upward pressure, low in the abdomen, actually elevating the position of the diaphragm. These observers report improvement of dyspnoea in the majority of cases.

However, comparatively little can be accomplished, generally speaking, in the treatment of pulmonary emphysema. The sufferer is severely disabled and handicapped. We can only hope to prevent the progression of the disease and to make our patient's existence more comfortable.

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# ABSTRACTS



**STURGIS, CYRUS C.:** An Appraisal of the Methods of Treating Pneumonia: Journal of the Michigan State Medical Society, 34: 59-64 (February) 1935.

The author discusses the value of the following therapeutic agents in the treatment of lobar pneumonia:

1. Antipneumococcus serum.
2. Digitalis.
3. Oxygen.
4. Morphine.

5. A miscellaneous group of drugs which are alleged to be of specific or symptomatic value.

Antipneumococcus Serum. — Felton's antipneumococcus serum is very satisfactory for use in patients who have pneumonia in which the Type I and II pneumococcus is the cause of the disease. So far there is no therapeutically active serum for Group III or IV. Serum treatment is much more effective when given within 96 hours after the initial symptoms of the disease have appeared. Any practitioner with very little special training can apply this type of treatment in such an efficient manner that, in Type I pneumonia at least, the mortality rate may be reduced more than one-half.

It should be emphasized that when certain circumstances prevail, the initial dose of the serum may be given before the type for the disease is determined. This is logical in certain patients who are critically ill when first seen and it appears urgent to begin the treatment at the earliest possible moment and thereby avoid the delay of some hours which is required in order to type the organism. These patients should be given an initial dose of a polyvalent antipneumococcus serum which is now available and is potent against Type I and II pneumococcus infections. Inasmuch as these two groups are responsible for over 50 per cent of all pneumococcus infections of the lungs, the chances are more than equal that an effective type of treatment will be applied. If subsequent typing of the sputum shows that the

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etiologic agent belongs to one of the other groups, the serum treatment should, of course, be discontinued.

Serum should not be administered without preliminary tests to determine if the patient is sensitive to this type of serum.

Oxygen Therapy. — Anoxemia occurs frequently in pneumonia and it may be eliminated by the proper oxygen therapy. The beneficial effects of oxygen therapy in pneumonia are shown by the following changes:

1. The patient is more comfortable as a result of quieter breathing.
2. The tachycardia is lessened and frequently there is a drop in body temperature and a slowing of the respiratory rate.
3. The arterial saturation is increased and the cyanosis disappears.
4. There is every reason to believe that life is prolonged and a longer period is thereby given for immunity processes to develop.

If oxygen therapy is to be used, it is essential that it should be instituted early in the course of the disease at a time when the earliest evidence of cyanosis appears. Furthermore, it should be continued for some time after it has completely disappeared.

Digitalis. — In patients with a heart of normal size, and this is usually the case in lobar pneumonia, the effect of digitalis is to decrease the volume output of the heart. This is because the heart is contracted to an inefficient size and although the strength of the shortened stroke is increased, the result is that the volume output of the heart falls. If digitalis in full

therapeutic doses is given to the usual patient with pneumonia, therefore, it will cause a decrease in cardiac output and a resultant deleterious effect. On the other hand, if a patient has a hypertrophied heart, the drug causes it to decrease to a more efficient size and this, with the increase in the strength of the stroke, causes an increase in the cardiac output. The indication for digitalis therapy in patients with lobar pneumonia, therefore, is a heart which is larger than normal or in the presence of auricular fibrillation or auricular flutter, and these two types of arrhythmia are estimated to occur in only about 5 per cent of all cases.

Miscellaneous Drugs. — The only drugs which the author has found to be of service in the treatment of lobar pneumonia are those which secure rest for the patient and relieve pains. Of greatest value are the hypnotic drugs, such as the barbituric acid derivatives, whether alone or in combination with codeine. If these preparations fail to secure rest, he does not hesitate to turn to the judicious use of morphine. Morphine is indispensable in some cases but it should be used only when other sedatives and hypnotics fail, and then with great discrimination. The untoward effects of morphine are sometimes very slight, but if cyanosis is marked and breathing labored, its depressing effect on the respirations may be minimized by administering  $7\frac{1}{2}$  grains of caffeine sodium benzoate intramuscularly or by placing the patient in an oxygen tent in which a 5 per cent carbon dioxide mixture is maintained as a stimulant to the respirations.



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